CORRECTED VERSION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
PCT 320		
International application No.	International filing date (*day/month/year*)	Priority Date (*day/month/year*)
PCT/KR 2004/000483	8 March 2004 (08.03.2004)	28 March 2003 (28.03.2003)

International Patent Classification (IPC) or national classification and IPC

IPC[7]: C11C 3/10, C07C 67/02

Applicant

KOREA INSTITUTE OF ENERGY RESEARCH

1. This international preliminary examination report has been prepared by this International Preliminary Examination Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

   - I. ☒ Basis of the opinion
   - II. ☐ Priority
   - III. ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV. ☒ Lack of unity of invention
   - V. ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI. ☐ Certain documents cited
   - VII. ☐ Certain defects in the international application
   - VIII. ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
08.10.2004	25 July 2005 (25.07.2005)
Name and mailing address of the IPEA/AT Austrian Patent Office Dresdner Straße 87 A-1200 Vienna Facsimile No. 1/53424/200	Authorized officer SEIRAFI M. Telephone No. 1/53424/224

Form PCT/IPEA/409 (cover sheet) (July 1998)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/KR 2004/000483

I. Basis of the report

1. With regard to the elements of the international application:*

☐ the international application as originally filed

☒ the description:
pages 1-19, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____.

☒ the claims:
pages 20-21, as originally filed
pages _____, as amended (together with any statement) under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____.

☒ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages 1-6, Figures 1-9, filed with the letter of 7 July 2005 (07.07.2005).

☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____.

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in printed form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____.

☐ the claims, Nos. _____.

☐ the drawings, sheets/fig _____.

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as „originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

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International application No.
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IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☐ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirements of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirements of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☒ complied with.
- ☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this opinion:

- ☒ all parts.
- ☐ the parts relating to claims Nos. _____.

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims ___	YES
	Claims 1-21	NO
Inventive step (IS)	Claims ___	YES
	Claims 1-21	NO
Industrial applicability (IA)	Claims 1-21	YES
	Claims ___	NO

Citations and explanations (Rule 70.7)

We refer to the response to the written opinion dated 2005-01-26 and amendment under PCT Article 34(2) concerning the new Figures 1-9 in the letter from 07.10.2004.

The following documents have been cited in the Search Report (prepared by APO dated 12.05.2004):

D1: AT 406 870 B
D2: WO1995/002661 A2
D3: WO 1993/009212 A1
D4: AT 386 222 B
D5: GB 612 667 A
D6: US 5 116 546 A
D7: EP 0 523 767 A2
D8: EP 0 535 290 A1
D9: AT 394 374 B
D10: EP 0562 504 A2
D11: EP 127 104 A1

Documents D2-D4 and D6-D11 define the relevant general state of the art and are not considered to be particularly relevant.

A closer reconsideration of the cited documents given the following evaluation different from the indicating given in the search report. Claims 1-21 are met fully by the disclosures of the Documents D1 and D5.

Consequently all the features of the subject matters of claims 1-21 of the present application have already been described.

D1: discloses production of fatty acid alkyl esters substitute by transesterification of triglycerides with an alcohol in presence of basic catalyst(s) comprising:

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International application No. PCT/KR 04/00483

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Box V (page 1)

the mixture of triglyceride, alcohol and catalyst is converted to form a ester phase and a glycerine phase;

(2) the phases are separated;

(3) the ester phase is divided into two parts, (A- ester phase) and (B-ester phase);

(4) part (A-ester phase) is purified to give pure fatty acid alkyl ester;

(5) part B-esterphase is mixed with more triglyceride, alcohol and catalyst and converted to form a new ester phase and a new glycerine phase and

(6) steps (2)-(5) repeated.

D5: relates to methods of production of fatty acid alkyl esters by pre-esterifying a free fatty acid, contained in oil/fat comprising reacting the oil/fat with methanol under acidic condition in the presence of an acidic alcoholysis catalyst to reduce the free fatty acid content and continuing the transesterifying reaction under alkaline conditions in the presence of an alkaline alcoholysis catalyst. (see page 2, lines 47-61 and claims 1-7 of the document D5).

However the subject matters of the present application are:

Claims 1, 3 and 10: method of producing bio diesel oil by transesterifying Oil/fat with alcohol in presence of alkyl ester,
Claim 4 and 15: the used oil/fat are vegetable oil/fat, animal oil/fat, waste frying oil, regenerated oil/fat and a mixture thereof),
Claims 5, 6, 16 and 17: the used alcohols are the group consisting of C1 to C10,
Claim 7 – 9 and 18-20: the used catalysts are basic or an acidic catalyst,

Claims 11-14 and 21: disclose a method of producing bio diesel comprising pre-estrification a free fatty acid, contained in oil/fat, with alcohol in a presence of an acidic catalyst; and transesterifying the pre-estrified oil/fat and alcohol in a presence of alkylester.

Documents D1 and D5 disclose essential features of a method of producing bio diesel oil by tranesesterification oil/fat (even pre-estrifying before tranesesterification) with short alcohol and basic catalyst in a presence of alkylester which form the subject matters by claims 1-21.

Compared with documents D1 and D5 cited in the search report the claims 1-21 of the present application are lacking of an inventive step and of novelty, because the method of production of bio diesel by transesterifying oil/fat (even pre-estrifying before tranesesterification) according to the claims 1-21 is comparable with the methods described in the mentioned documents D1 and D5.

Accordingly, the subject matters of the application are not new and do not involve an inventive step.

The industrial applicability of the present application is obvious.

FIG. 1

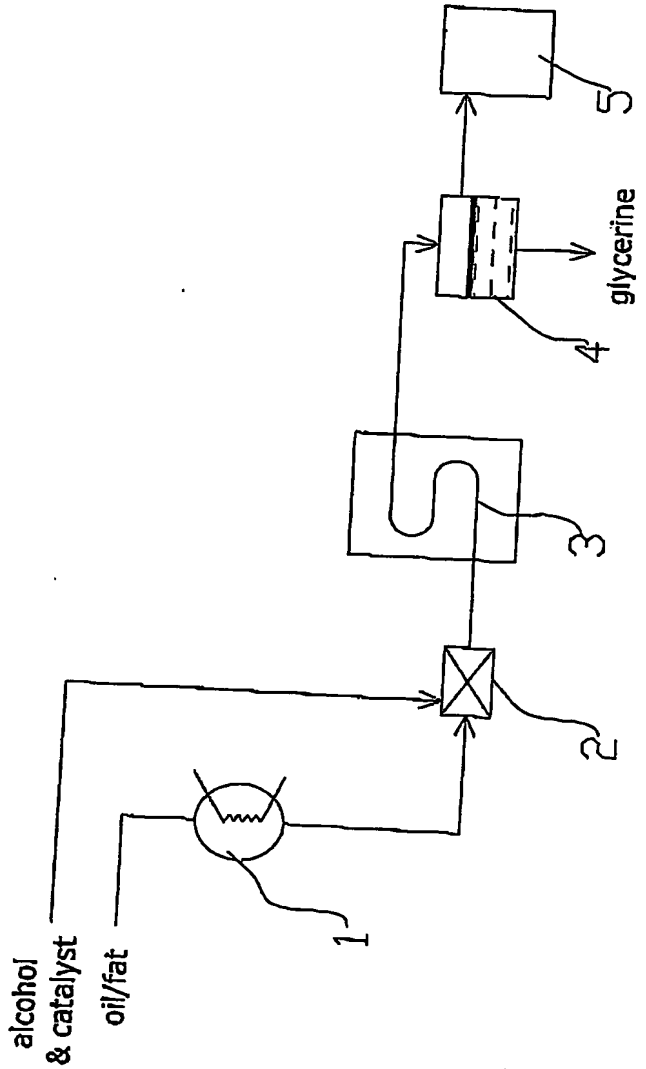


FIG. 2

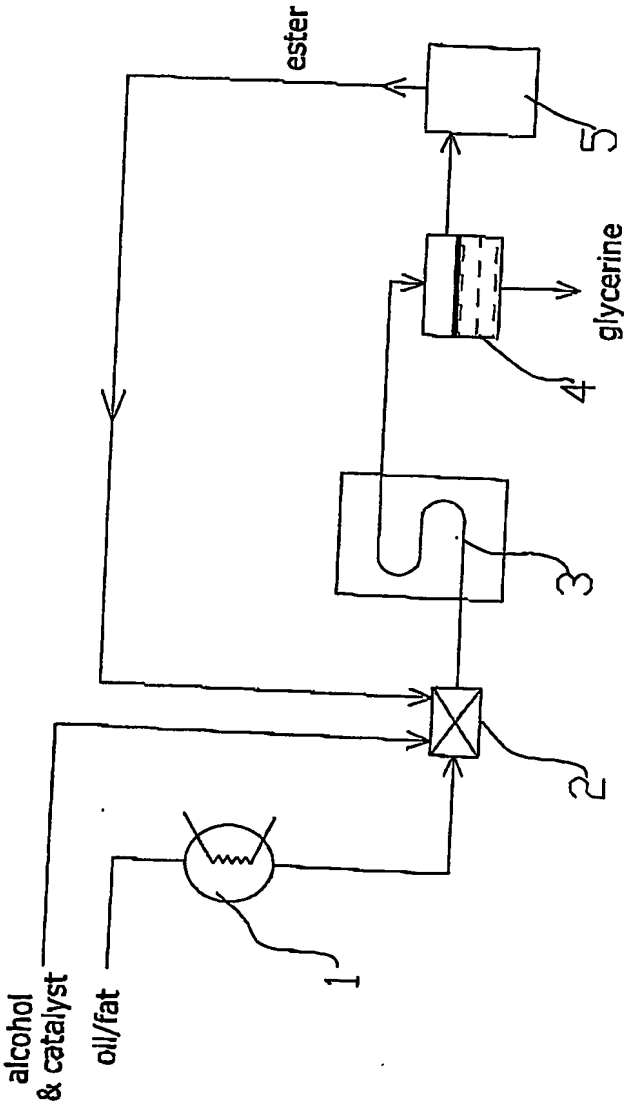


FIG. 3

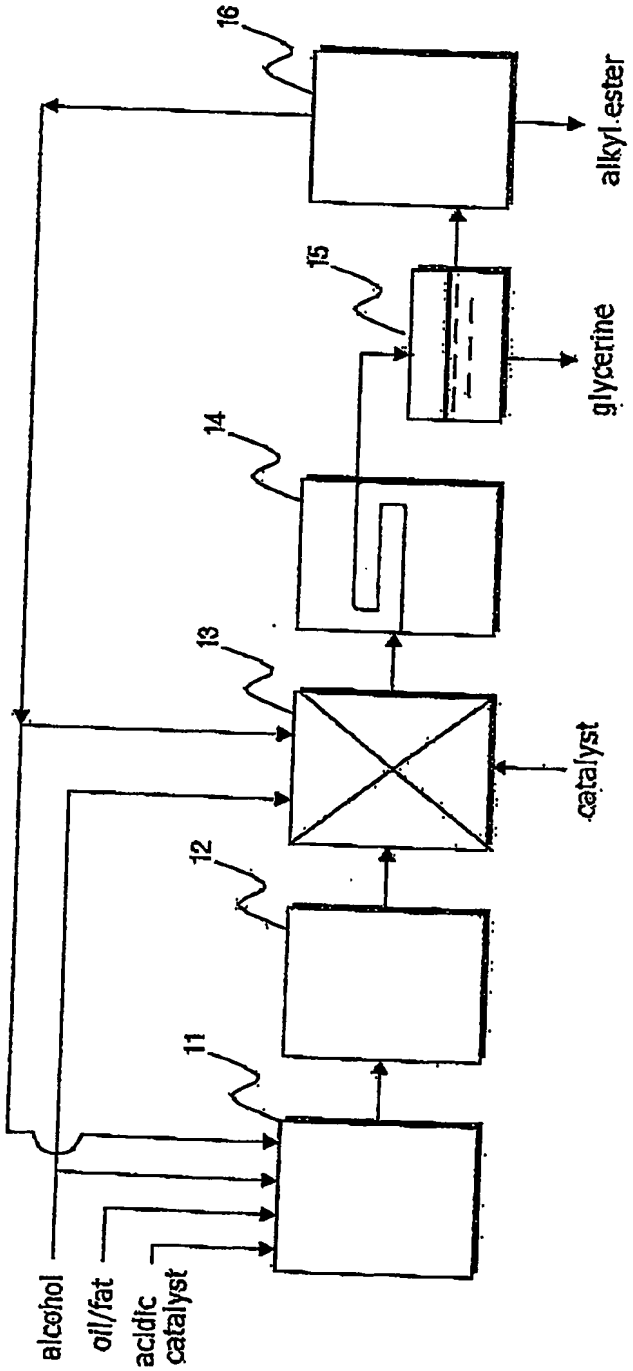
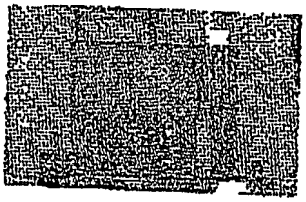
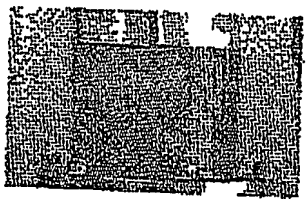

16
alkyl ester
15
glycerine
14
13
catalyst
12
11
alcohol
oil/fat
acidic catalyst

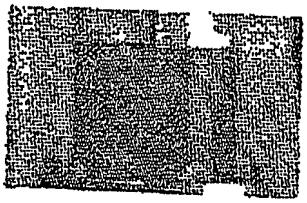
FIG. 4A



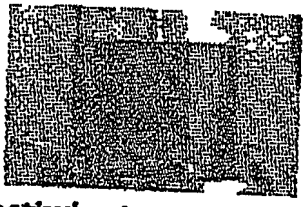
methyl ester 5%, 0min.



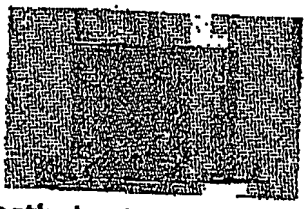
methyl ester 5%, 0.5min.



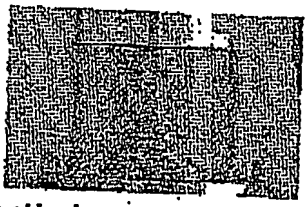
methyl ester 5%, 1min.



methyl ester 5%, 1.5min.



methyl ester 5%, 2min.



methyl ester 5%, 5min.

FIG. 4B

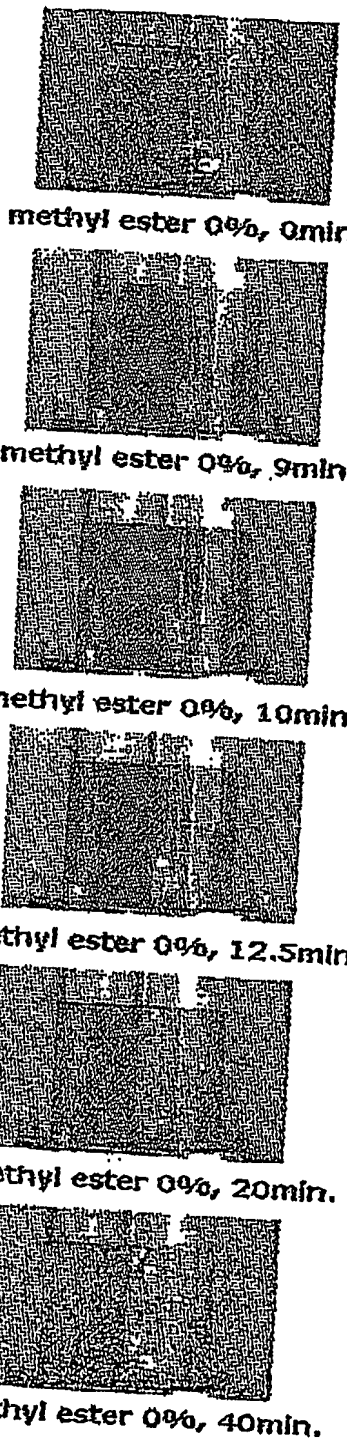


FIG. 5

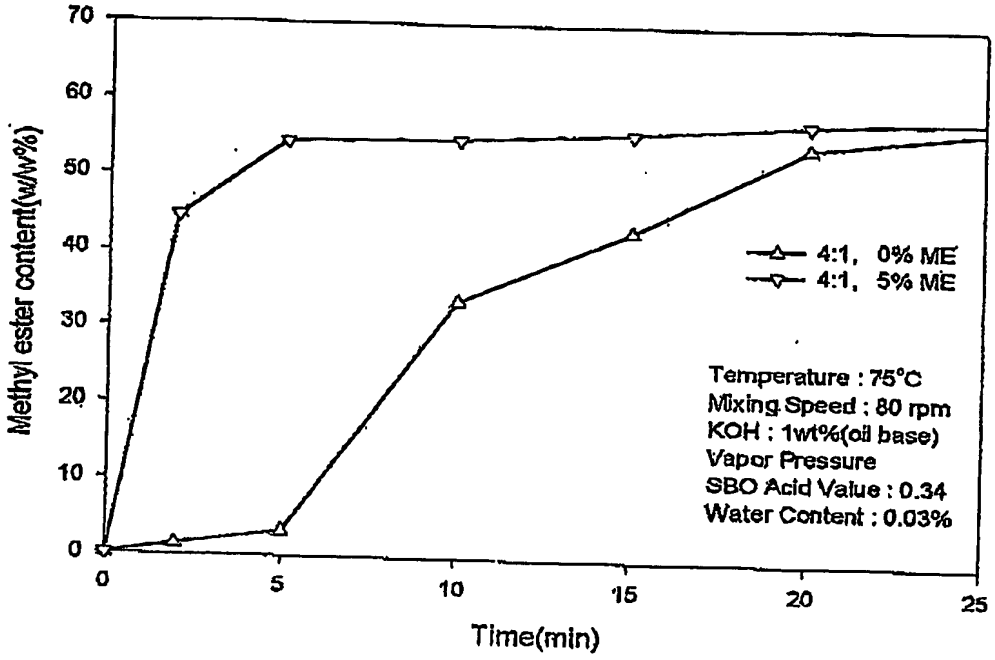
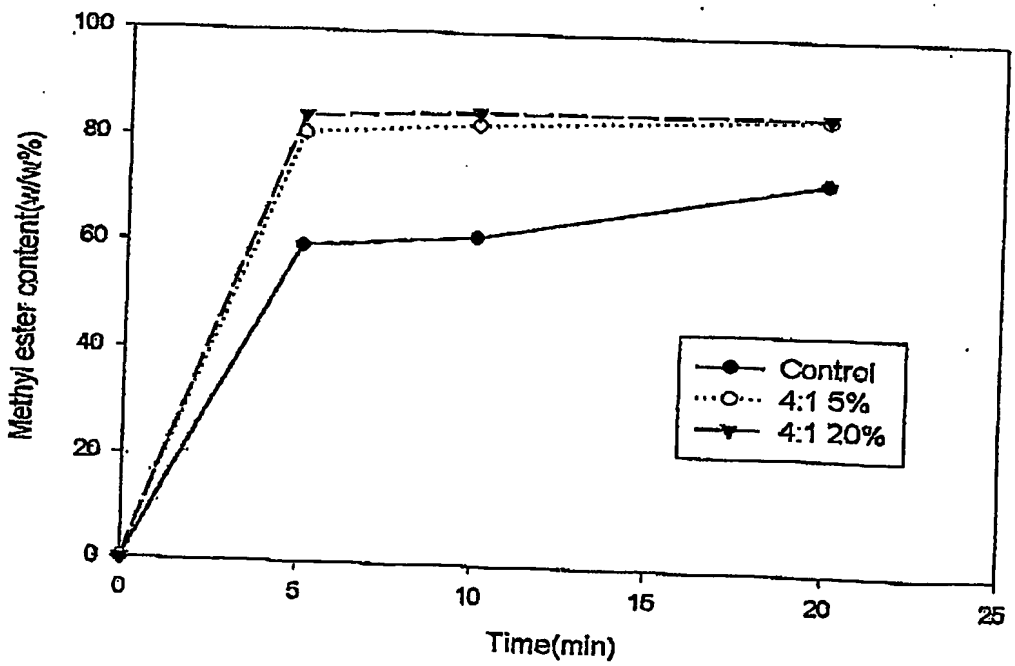


FIG. 6



AMENDED SHEET

BEST AVAILABLE COPY

FIG. 7

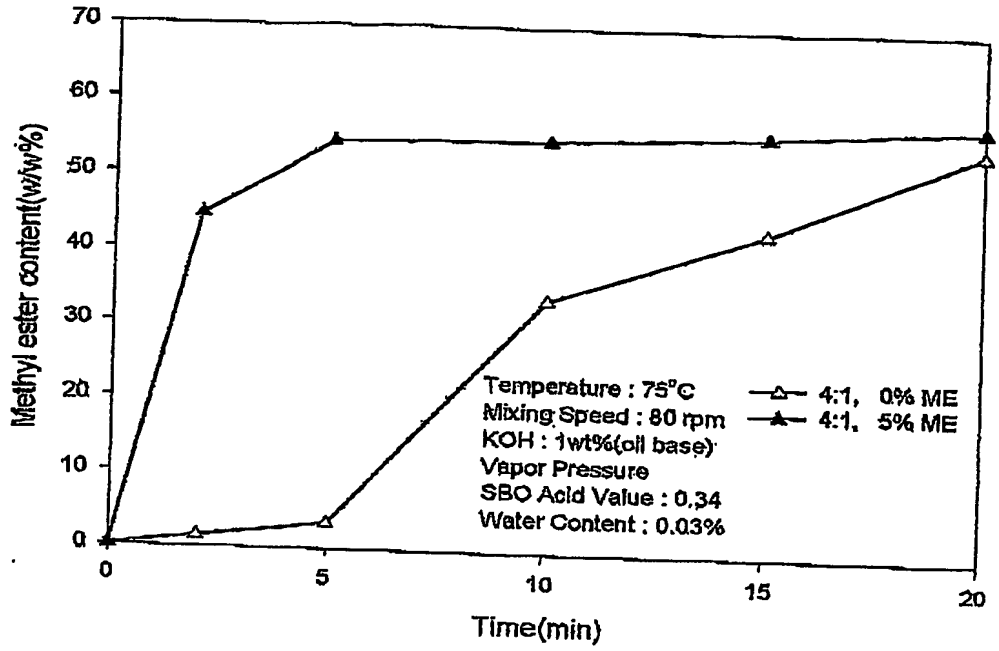
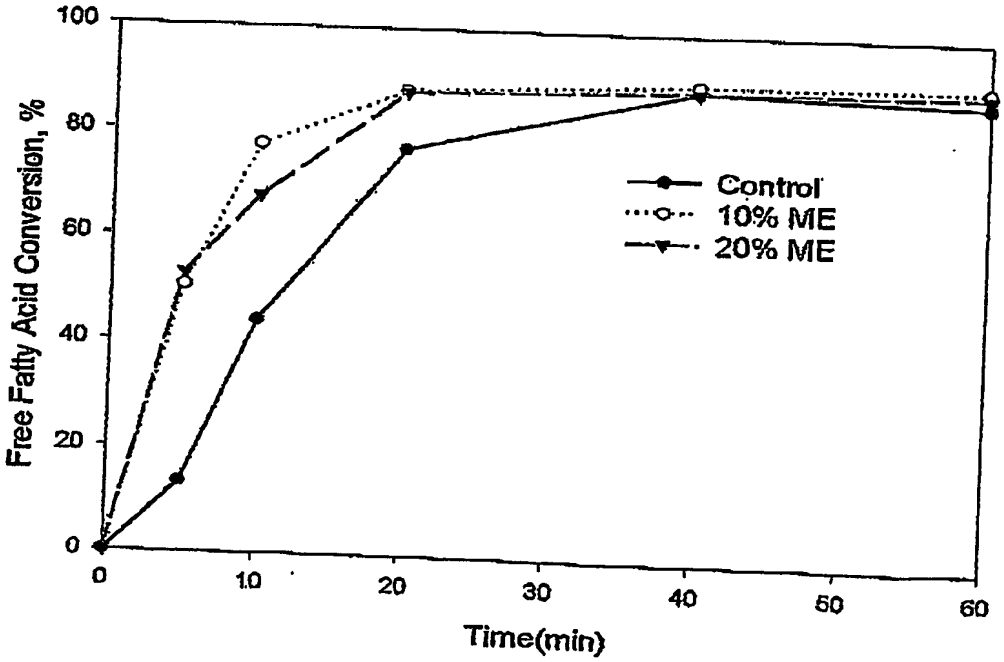

Methyl ester content(w/w%)
Time(min)
Temperature : 75°C
Mixing Speed : 80 rpm
KOH : 1wt%(oil base)
Vapor Pressure
SBO Acid Value : 0.34
Water Content : 0.03%
4:1, 0% ME
4:1, 5% ME

FIG. 8


Free Fatty Acid Conversion, %
Time(min)
Control
10% ME
20% ME